

and constructed and its contents so limited that under the tests specified in § 71.71 ("Normal conditions of transport")—

- (1) The contents would be subcritical;
- (2) The geometric form of the package contents would not be substantially altered;
- (3) There would be no leakage of water into the containment system unless, in the evaluation of undamaged packages under § 71.59(a)(1), it has been assumed that moderation is present to such an extent as to cause maximum reactivity consistent with the chemical and physical form of the material; and
- (4) There will be no substantial reduction in the effectiveness of the packaging, including:
 - (i) No more than 5 percent reduction in the total effective volume of the packaging on which nuclear safety is assessed;
 - (ii) No more than 5 percent reduction in the effective spacing between the fissile contents and the outer surface of the packaging; and
 - (iii) No occurrence of an aperture in the outer surface of the packaging large enough to permit the entry of a 10 cm (4 in) cube.
- (e) A package used for the shipment of fissile material must be so designed and constructed and its contents so limited that under the tests specified in § 71.73 ("Hypothetical accident conditions"), the package would be subcritical. For this determination, it must be assumed that:
 - (1) The fissile material is in the most reactive credible configuration consistent with the damaged condition of the package and the chemical and physical form of the contents;
 - (2) Water moderation occurs to the most reactive credible extent consistent with the damaged condition of the package and the chemical and physical form of the contents; and
 - (3) There is full reflection by water on all sides, as close as is consistent with the damaged condition of the package.

[60 FR 50264, Sept. 28, 1995; 61 FR 28724, June 6, 1996]

§ 71.57 [Reserved]

§ 71.59 Standards for arrays of fissile material packages.

(a) A fissile material package must be controlled by either the shipper or the carrier during transport to assure that an array of such packages remains subcritical. To enable this control, the designer of a fissile material package shall derive a number "N" based on all the following conditions being satisfied, assuming packages are stacked together in any arrangement and with close full reflection on all sides of the stack by water:

- (1) Five times "N" undamaged packages with nothing between the packages would be subcritical;
 - (2) Two times "N" damaged packages, if each package were subjected to the tests specified in § 71.73 ("Hypothetical accident conditions") would be subcritical with optimum interspersed hydrogenous moderation; and
 - (3) The value of "N" cannot be less than 0.5.
- (b) The transport index based on nuclear criticality control must be obtained by dividing the number 50 by the value of "N" derived using the procedures specified in paragraph (a) of this section. The value of the transport index for nuclear criticality control may be zero provided that an unlimited number of packages is subcritical such that the value of "N" is effectively equal to infinity under the procedures specified in paragraph (a) of this section. Any transport index greater than zero must be rounded up to the first decimal place.

(c) Where a fissile material package is assigned a nuclear criticality control transport index—

- (1) Not in excess of 10, that package may be shipped by any carrier, and that carrier provides adequate criticality control by limiting the sum of the transport indexes to 50 in a non-exclusive use vehicle, and to 100 in an exclusive use vehicle.
- (2) In excess of 10, that package may only be shipped by exclusive use vehicle or other shipper controlled system specified by DOT for fissile material packages. The shipper provides adequate criticality control by limiting